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Case Report

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Bradycardia in severely dehydrated cholera patient: A case report

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ABSTRACT

Rationale: Cholera is an acute diarrheal disease caused by the ingestion of food or water contaminated by *Vibrio cholerae*. It threatens global health and signifies a lack of proper access to clean water and sanitation. If not treated properly, cholera causes severe watery diarrhea that can lead to hypovolemic shock.

Patient's Concern: A 23-year-old male patient was admitted with severe diarrhea with a frequency of fifteen to twenty loose, watery stools and was severely dehydrated. The patient developed severe bradycardia with a positive serum troponin level and no chest pain. Initial electrocardiogram on the day of admission was sinus tachycardia with a heart rate of 120 beats/min on the third day of admission, the patient developed bradycardia with a heart rate of 45 beats/min with a prolonged QT interval of 550 msec (corrected QT interval 476 msec).

Diagnosis: Cholera with sinus bradycardia with prolonged QT interval.

Interventions: Based on the clinical situation and the inferior vena cava status determined by ultrasound, a thorough fluid resuscitation using crystalloids was performed. The patient was then administered antibiotics: oral doxycycline 300 mg *STAT* and intravenous ciprofloxacin 15 mg/kg twice daily for three days.

Outcomes: After 5 days of adequate hydration and antimicrobial treatment, diarrhea was resolved and heart rate improved with no electrocardiogram abnormalities.

Lessons: This case report highlights the importance of timely diagnosis and managing severe diarrhea in cholera patients to prevent morbidity and mortality. Public awareness regarding cholera and its complications is necessary for the betterment of the community.

KEYWORDS: Diarrhea; Bradycardia; Cholera

1. Introduction

Cholera is an acute secretory diarrhea caused by the bacteria *Vibrio cholerae* (*V. cholerae*). It takes between 12 hours and 5 days for a person to show symptoms after consuming contaminated food or water. The infection is transmitted *via* the fecal-oral route and can vary in severity[1].

The clinical presentation of cholera varies from being asymptomatic to severe profuse watery diarrhea. The stool is typically described as having rice water consistency. Fluid loss results inhypovolemia, dry oral mucosa, cool skin, and decreased skin turgor. Poor tissue perfusion results in lactic acidosis, leading to hyperventilation and Kussmaul breathing. Electrolyte imbalances such as hypokalemia and hypocalcemia can be responsible for generalized muscle weakness and cramping.

Management of the disease included rigorous fluid resuscitation with electrolyte correction. After adequate hydration, antimicrobial therapy such as doxycycline (300 mg *STAT*) or ciprofloxacin (15 mg/kg twice a day for 3 days) should be started. Complications of cholera include severe dehydration, acute tubular necrosis, renal failure, hypovolemic shock, and death[2]. Cholera is often preventable by clean water supply, sanitation, and good hygiene practices.

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This case report describes bradycardia as a rare complication of cholera that resolved after aggressive fluid resuscitation and antimicrobials.

2. Case report

A 23-year-old male patient presented in the critical care unit with chief complaints of ten episodes of loose, watery stool for one day with abdominal pain and vomiting. Ethical approval is taken from the institute ethics committee with the patient informed consent (Approval No.SVIEC/ON/Medi/RP/Oct/24/9).

History of food consumption at unhygienic places present. On examination, the patient was lethargic, conscious, and oriented to time, place, and person present. General examination is suggestive of sunken eyes, dry tongue, and decreased skin turgor. There was dark-colored urine and a decreased amount in the urine bag. Vitals suggestive of pulse rate of 140 beats/min, regular, respiratory rate of 22/min, blood pressure was 70/40 mmHg, and SpO_2-98% on room air. Initial investigations suggest an increased total white blood cell count of 20 000 cell/cumm (normal range 4 000-11 000), increased hemoglobin 17.8 gm% (13 gm%-17 gm%) with hematocrit 54.8% (40%-53%) and a normal platelet count of 3 lac/cumm (1.5-4.5 lac/cumm). Serum sodium 134 mmol/L (135-145 mmol/L), serum potassium 3.9 mmol/L (3.5-5.5 mmol/L), serum magnesium 1.8 mg/dL (1.7-2.2 mg/dL), serum creatinine 5.4 mg% (0.6 mg%-1.3 mg%), and serum urea 49 mg/dL (11-45 mg/dL). Liver function tests were normal, and C-reactive protein was 26 mg/L (<0.3 mg/dL). Ultrasonography abdomen and pelvis was not remarkable. Electrocardiogram on the day of admission was sinus tachycardia with a rate of 140 beats/min. Transthoracic electrocardiography suggests normal contractility with no regional wall motion abnormality and a completely collapsed inferior vena cava. Stool darting motility was positive, and stool culture was suggestive of *V. cholerae*.

The patient was started on intravenous fluid ringer lactate bolus through a large bore peripheral Ⅳ line, depending upon the clinical condition of the lungs and urine output. The patient was also started on oral antimicrobial tablet doxycycline 300 mg *STAT*. The patient's stool frequency was still high even on the third day, and accordingly, fluid resuscitation was done. Serum creatinine was in a decreasing trend, 3.9 mg/dL on day 3, with improving urine output. On the third day of admission, the patient developed bradycardia with a heart rate of 36 beats/min with prolonged QT interval and no symptoms of chest pain or ghabhraman. Serum potassium was 2.6 mmol/L with normal magnesium. Serum troponin was positive. Electrocardiography suggests normal contractility with inferior vena cava collapsible (1 cm with respiratory variation). The patient was started on ciprofloxacin 15 mg/kg twice a day for 3 days and vigorous hydration with Ⅳ fluids done with intravenous potassium correction. After 5 days of treatment, the patient started gradually improving, with no further episodes of watery diarrhea or vomiting. The patient's bradycardia improved, and the heart rate remained between 70 and 80 beats/min.

3. Discussion

Cholera is a secretory diarrheal illness caused by *V. cholera*. It leads to severe watery diarrhea, fluid loss, and electrolyte imbalance, and hypovolemic shock. Complications such as acute renal failure, acute tubular necrosis, and rarely myocarditis may occur. The World Health Organization approximates 1.4 million to 4.0 million cases and 21 000 to 143 000 deaths globally due to the disease per year[3]. Vigorous fluid resuscitation with antimicrobials is key to the management of cholera.

In this case report, we have mentioned cholera leading to severe dehydration, acute renal failure, hypokalemia and sinus bradycardia with QT prolongation. Rare case reports of myocarditis due to cholera are present. In the case report by Leon *et al*., there is a case of cholera-induced myocarditis with electrocardiographic changes characterized by trifascicular block (prolonged P-R interval), complete right bundle branch block, and left posterior hemiblock with a cardiac rate of thirty beats per minute, which improved with permanent pacemaker insertion. Endomyocardial biopsy showed histopathologic signs of myocarditis, and the immunologic study of the cardiac tissue revealed a positive polymerized chain reaction with the presence of antitoxin choleric antibodies[4].

As per the article by Bhattacharya, the mainstay of therapy for cholera patients is rehydration with oral rehydration salt solution or intravenous Ringer's lactate depending upon the degree of dehydration. Antibiotics such as tetracycline, doxycycline, norfloxacin, ciprofloxacin and furazolidone may be used as an adjunct to rehydration therapy for severely purging cholera patients to reduce the rate of stool output[5]. In our study, the patient was started on aggressive fluid resuscitation, antimicrobials doxycycline 300 mg *STAT* and ciprofloxacin 400 mg Ⅳ twice daily for 3 days. After 5 days of Ⅳ fluids and antimicrobials, the patient improved clinically, and bradycardia was normalized.

This study presents a rare case report of bradycardia induced by severe diarrhea caused by *V. cholerae* which improved with appropriate fluid resuscitation and antimicrobials.

Conflict of interest statement

The authors report no conflict of interest.

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